PATENT SPECIFICATION (11) 1 488 761

1 488 761

(21) Application No. 5384/75 (22) Filed 7 Feb. 1975
(23) Complete Specification filed 21 Jan. 1976
(44) Complete Specification published 12 Oct. 1977
(51) INT CL² H01H 3/04
(52) Index at acceptance H1N 445 45X 590 616 744
(72) Inventor RAYMOND HOLMES

(19)

(54) ELECTRIC SWITCHING DEVICES

(71) We, BURGESS MICRO SWITCH COMPANY LIMITED, of Dukes Way, Team Valley, Gateshead, Tyne & Wear, NE11 0UB, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to electric switching devices including a plurality of switching mechanisms adapted to be actuated in a predetermined sequence.

According to the present invention there is provided an electric switching device including a carrier member on which are mounted a plurality of electric switches, each switch including a housing containing a switching mechanism, and an operating button slidably mounted in, to project from, said housing, the device further including an operating member pivotally mounted to the carrier member and provided with a plurality of actuating elements, one associated with each switch and each operatively coupled to the operating shutter of the associated switch, the arrangement being such that, on pivoting movement of said operating member on the carrier member, the actuating elements each effect depression of the operating button of the associated switch thereby to actuate said switches in a predetermined sequence.

Preferably the switches each include an associated lever pivotally mounted on the housing and extending over the operating button in such a manner that depression of the lever results in depression of the operating button and actuation of the switching mechanism. In such a case each actuating element of the operating member, on pivoting movement of said member, engages with, to effect depression of, an associated lever thereby actuating the switches in the predetermined sequence.

Conveniently the actuating elements are adjustably mounted on the operating member and may comprise screws extending through correspondingly-threaded bores in the operating member.

In a preferred embodiment of the invention the switching device is sealingly mounted in an outer casing, the required pivoting movement of the operating member being effected by depression of a push-button member slidably mounted in, to project from, said outer casing.

By way of example only, the invention will now be described in greater detail with reference to the accompanying drawing which shows the internal arrangement, partly in vertical section, of a switching device according to the invention.

Subsequent to the development of a fault in certain equipment it is often desirable for a series of operations to be effected in a particular sequence. In coal mines, for example, an observer commonly monitors a plurality of stations associated with certain equipment and, when a fault develops, it is desirable that:

a) the observer be given a numerical indication of the station at fault;

b) the equipment be stopped;

c) a visible indication that the equipment has been stopped by given.

The accompanying drawing illustrates a switching device particularly suited to use in mines to effect the above-detailed sequence of operations, although said switch has many other applications and uses.

Referring to the drawing the switching device includes a carrier member indicated generally at 2 and comprising a base portion 4 and an upstanding wall portion 6. Three identical snap-action electric microswitches, one of which is referenced 8, are mounted side by side in the base portion 4 with the terminal tabs 10 thereof extending through, to project from the bottom surface or, said portion 4.

The switches each have an operating button 12 slidably mounted in, to project from, an associated housing 13, while aligned levers 14 are pivotally mounted at 16, one to each housing, to extend over associated

buttons 12, each button 12 and lever 14 being resiliently biased to the illustrated rest position.

A plate-like operating member 18 is pivotally mounted at 20 to the upper regions of the wall portion 6 of the carrier member 2, the length of the operating member 18 being such as to terminate beyond the free ends of the levers 14 and the width of said member 18 being such as to extend over all three aligned switches 8.

Three screws 22, one associated with each switch 8, are mounted in correspondingly-threaded bores formed through the operating member 18, each screw being located directly above the free end of the lever 14 of its associated switch. The screws 22 each project by different small amounts from the bottom surface of the operating member 18 and it will thus be appreciated that, on depression of the free end of the member 18 to pivot said member in an anti-clockwise direction, as viewed in the drawing, about the pivot 16, the screws are brought, in turn, into contact with, to depress, their associated levers 14 thereby to actuate, in turn, the switches 8. The sequence of switch actuation can be altered by appropriate threaded adjustment of the positions of the screws 22 in the operating member 18 while, for a predetermined sequence, the relative timings of the three snap-action movements can similarly be varied. Once a particular sequence has been obtained by said appropriate adjustment of the screws 22, said screws may, if desired, be locked in position by means of, for example, an adhesive, although clearly other means of locking could be used.

In the preferred application of the device in mines, the atmosphere is often dusty and moisture-laden and may contain inflammable gases. Thus it is advisable that the device be fully-protected from the influence of its surroundings. This protection is achieved by sealingly mounting the device, one the required sequence has been set and the necessary electrical wiring effected, in an outer casing 24.

A push-button member 26 is slidably mounted in, to project from, a bore 28 in the casing 24 with the innermost end of said member located directly above the free end of the operating member 18. A resilient cowl 30 reacting between the casing 24 and the button member 26 effects seal between said casing 24 and member 26 and also biases said member to the illustrated outermost rest position.

The operating member 18 is resiliently biased, by means of a coil spring 32 reacting between the bottom of a recess 34 formed in the carrier member 2 and the lower surface of the free end of said member 18, to the rest position shown in the drawing, in which position the upper surface of the free end of the operating member engages with the innermost end of the push-button member 26.

A pair of stop members 36, located on the upper surface of the base portion 4 of the carrier member 2, one to each side of the push-button member 26, determine the fully-displaced position of the operating member 18.

Thus it will be appreciated that depression of the push-button member 26 relative to the casing 24 results in pivoting movement of the operating member 18 against the bias of the spring 32 and subsequent actuation of the switches 8. On release of the member 26, the operating member 18 is returned to its rest position by means of the levers 14 and the spring 32.

Leads 38 may be provided each making electrical contact with one of the terminal tabs 10, said leads extending through, to project from, the casing 24 to permit electrical connection of the device to associated apparatus.

Thus the invention provides a switching device operation of which results in a predetermined sequence of events being effected, an electric switch within the device being associated with each of said events.

WHAT WE CLAIM IS:—

1. An electric switching device including a carrier member on which are mounted a plurality of electric switches, each switch including a housing containing a switching mechanism, and an operating button slidably mounted in, to project from, said housing, the device further including an operating member pivotally mounted to the carrier member and provided with a plurality of actuating elements, one associated with each switch and each operatively coupled to the operating shutter of the associated switch, the arrangement being such that, on pivoting movement of said operating member on the carrier member, the actuating elements each effect depression of the operating button of the associated switch thereby to actuate said switches in a predetermined sequence.

2. An electric switching device as claimed in claim 1 in which the switches each include an associated lever pivotally mounted on the housing and extending over the operating button, the arrangement being such that, on pivoting movement of the operating member, the actuating elements each engage with, to effect depression of, an associated lever, said levers depressing associated operating buttons and actuating said switches in the predetermined sequence.

3. An electric switching device as claimed in claim 1 or claim 2 in which the actuating

elements are mounted on the operating member to be adjustable relative thereto.

4. An electric switching device as claimed in claim 3 in which the actuating elements comprise screws extending through correspondingly-threaded bores in the operating member.

5. An electric switching device as claimed in any one of claims 1 to 4 and sealingly mounted in an outer casing, the required pivoting movement of the operating member being effected by depression of a push-button member slidably mounted in, to project from, said outer casing.

6. An electric switching device as claimed in claim 5 together with claim 2 in which the operating member is pivotally mounted, at one end thereof, to the carrier member to extend over and terminate beyond the free ends of the levers, the free end of said operating member being located below, for engagement by, said push-button member.

7. An electric switching device as claimed in claim 6 in which the free end of the operating member is resiliently urged towards the push-button member.

8. An electric switching device substantially as described with reference to and as illustrated by the accompanying drawing.

MEWBURN ELLIS & CO.,
Chartered Patent Agents,
70 & 72, Chancery Lane,
London, W.C.2A. 1AD,
and
87, Westgate Road,
Newcastle upon Tyne,
NE1 4AE.
Agents for the Applicants.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1977.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1488761 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*